Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the Commission's Rules	)	WP Docket No. 07-100
	)	

REPLY COMMENTS OF NEW AMERICA'S OPEN TECHNOLOGY INSTITUTE AND PUBLIC KNOWLEDGE

Amir Nasr
Michael Calabrese
Wireless Future Project
New America's Open Technology Institute
740 15th Street NW, Suite 900
Washington, D.C. 20005

Harold Feld
Kathleen Burke
Admitted to the Bar under D.C. App. R. 46-A (Emergency Examination Waiver)
Public Knowledge
1818 N. Street NW, Ste 410
Washington, D.C. 20036

January 11, 2021

Table of Contents

I. Introduction and Summary

New America's Open Technology Institute and Public Knowledge ("OTI and PK") respectfully submit reply comments in response to arguments in the record discussing the Commission's Eighth Further Notice of Proposed Rulemaking in the above-captioned proceeding ("FNPRM").[1] OTI and PK urge the Commission to allow open and coordinated secondary use of the 4.9 GHz band with interference protection managed by an automated frequency coordination system, such as that adopted in the 6 GHz or Citizens Broadband Radio Service (CBRS), to ensure the widest and most effective use of the spectrum possible.

First, the record reflects strong support for secondary spectrum sharing by non-public-safety users on either an unlicensed or licensed-by-rule basis. The record supports the adoption of a database coordination mechanism to facilitate secondary, open access use of the 4.9 GHz band while simultaneously protecting incumbent public safety operators and coordinating among public safety entities with overlapping jurisdictions.

Second, the record shows overwhelming evidence that dynamic spectrum management systems have grown to be adequately sophisticated to facilitate the sharing of public safety spectrum for a wide range of commercial uses while protecting incumbent providers with sensitive and real-time operations from harmful interference.

Finally, opening the 4.9 GHz band for open secondary access would yield several key public interest benefits, most notably boosting fixed wireless broadband in rural, Tribal, and other high-cost areas, offering capacity to enterprise networks, and reinvigorating the equipment ecosystem in the band, thereby driving down costs for incumbent public safety operators.

[1] Order on Reconsideration and Eighth Further Notice of Proposed Rulemaking, WP Docket No. 07-100 (Rel. Oct. 1, 2021) ("FNPRM"). All references to "Comments" are to those filed in this proceeding on Nov. 29, 2021, unless otherwise specified.

II. The Record Strongly Supports Secondary Shared Use Coordinated by an Automated Database to Protect Primary Public Safety Operations

The record reflects strong support for authorizing coordinated secondary use of the 4.9 GHz band, which would bring widespread benefits without causing the harmful interference to incumbents in the band. Like nearly every proceeding that proposes to open underutilized spectrum for more widespread and efficient use, the reaction of many incumbent licensees is to oppose sharing. While caution by public safety entities is understandable, their concerns rest on outdated assumptions about potential interference purportedly inherent in coordinated sharing. The record demonstrates that modern spectrum sharing techniques, such as those used in the CBRS band to protect U.S. military systems, make sharing the 4.9 GHz band with non-public safety use on a secondary basis safe for emergency communications.

Indeed, the support for sharing—even if conditional or narrow—of some notable public safety entities demonstrates that spectrum coordination technologies have been proven to work effectively and safely in other bands. The Association of Public-Safety Communications Officials International, Inc. ("APCO") acknowledges the potential benefits of sharing, stating that "[s]haring has the potential to achieve the Commission's spectrum efficiency goals and create opportunities for incumbents and new entrants alike in the 4.9 GHz band. Opening the band to more users can also encourage equipment manufacturers to innovate and develop an expanded device ecosystem for the band."[2] The Public Safety Spectrum Alliance similarly "supports secondary use of the band for capacity not being utilized by public safety," with the caveat that first responders hold priority over secondary use.[3]

[2] Comments of the Association of Public-Safety Communications Officials International, Inc. at 7 ("Comments of APCO").
[3] Comments of the Public Safety Spectrum Alliance at 5.

In addition, several state-level entities with expertise in coordinating public safety wireless communications and interoperability agree that Spectrum Access Systems (SAS) technology is an appropriate means by which the Commission can protect public safety operations in the context of expanded shared use of the 4.9 GHz band. In a joint filing, the Pennsylvania State Police, Statewide Radio Network Division; the District of Columbia Statewide Interoperability Coordinator; the Pennsylvania State Police; the Iowa Statewide Interoperable Communications System Board; the State of South Carolina Department of Administration; the State of Maryland; and the State of Washington note: "This form of spectrum management should ensure that public safety and other priority users receive protection from interference in a manner similar to the methodology employed in CBRS to protect the Navy."[4]

The SAS is a means by which spectrum sharing and access can be expanded, but also a method to facilitate more extensive and protected use of the band for incumbents as well. As discussed below, public safety entities will ultimately benefit from expanded use of the band through the realization of economies of scale in 4.9 GHz equipment. Prospects for sharing are particularly promising in this context since, after decades, fewer than 4 percent of eligible public safety entities deploy any systems or services in the band. This 50-megahertz swath of extremely valuable mid-band lies largely fallow outside of major metropolitan areas. In addition to the obvious value that can be unlocked by allowing secondary sharing, this pattern of use makes it

[4] Comments of The State of Maryland, with the District of Columbia Statewide Interoperability Coordinator, the Pennsylvania State Police, the Iowa Statewide Interoperable Communications System Board, the State of South Carolina Department of Administration, and the State of Washington, at 10-11 ("We have previously discussed a process method to prioritize use and once adopted, would be communicated to SAS administrators for implementation. If the Commission adopts the technology, new permitted users should be required to operate in the 4.9 GHz band with SAS connected devices."); Comments of The Pennsylvania State Police, Statewide Radio Network Division at 9-10.

particularly easy to implement an automated coordination mechanism that facilitates secondary use and also resolves potential conflicts among primary public safety licensees, creating a win-win outcome that maximizes public interest.

A. Precedent Demonstrates the Secondary Shared Use of Underutilized Spectrum Does Not Inherently Cause Harmful Interference

The record shows strong support for the proposition that an automated coordination mechanism, informed by updated deployment data in the Commission's Universal Licensing System ("ULS"), can coordinate shared, secondary access to unused capacity in the 4.9 GHz band while completely protecting incumbent public safety operators. Prominent among the entities acknowledging the importance of formal, coordinated sharing is APCO, which explicitly states that frequency coordination can protect public safety operations from harmful interference. APCO states: "Frequency coordination is the most effective way to promote public safety use of the band and will complement any spectrum-sharing technologies that might be adopted for the band by increasing efficiency in spectrum use and preventing interference."[5]

APCO goes on to state that so long as the Commission is able to guarantee the integrity of public safety operations, opening the 4.9 GHz band for secondary commercial use holds the "potential to achieve the Commission's spectrum efficiency goals and create opportunities for incumbents and new entrants alike, while also "encourag[ing] equipment manufacturers to innovate and develop an expanded device ecosystem for the band."[6] The Public Safety Spectrum

[5] Comments of APCO at 3.
[6] *Id.* at 7.

Alliance ("PSSA") also "supports secondary use of the band for capacity not being utilized by public safety" provided that first responders can preempt secondary use at any time.[7]

Several commenters representing entities that operate in the 4.9 GHz band express concern that opening the band for shared use could cause harmful interference—conclusory assertions made without the benefit of any studies, tests or other factual basis to support their claims.[8] Current coordination systems certified by the Commission and the history of spectrum management in the U.S. demonstrates that in 2022 these concerns are misplaced. Automated database coordination in the CBRS and 6 GHz bands reflect the fact that automated geolocation sharing systems are fully capable of eliminating any significant risk of harmful interference in the 4.9 GHz band. The Commission itself recognized this reality in the *FNPRM*, stating that multiple Spectrum Access Systems "currently are used to protect several types of incumbent operations—including critical Department of Defense radar systems, fixed satellite service earth stations, and incumbent terrestrial wireless licensees—as well as two tiers of users in the Citizens Broadband Radio Service."[9]

The record reflects the overwhelming evidence that dynamic spectrum management systems have proven to be a reliable and cost-effective means of coordinating secondary use of an occupied band, while fully protecting incumbent operations from harmful interference, even those with sensitive and real-time operations, such as the U.S. Navy. In fact, prior precedents in

[7] Comments of the Public Safety Spectrum Alliance, WP Docket No. 07-100 (filed Nov. 29, 2021) at 5. *See also* Comments of the Wireless Internet Service Providers Association at 20-21 (supporting the right of public safety licensees to preempt unlicensed use during mission-critical situations) ("Comments of WISPA").

[8] *See e.g.*, Comments of the National Public Safety Telecommunications Council at 19; Comments of American Association of State Highway and Transportation Officials, WP Docket No. 07-100 (filed Nov. 29, 2021) ("Comments of AASHTO") at 3; Comments of State of California Department of Transportation, WP Docket No. 07-100 (filed Nov. 29, 2021) ("Caltrans Comments") at 4.

[9] FNPRM ¶ 70.

spectrum sharing frameworks such as the CBRS band in the 3.5 GHz band show how opening an underutilized band of spectrum for broader use by a wider variety of entities can bring the spectrum coordination needed to strengthen competition, consumer welfare, and innovation while robustly protecting incumbent operations. The Commission should build on these precedents—and the need for database coordination in the band—to implement the spectrum sharing framework that can make this frequency equitably available for a wide variety of providers on an open and free basis.

OTI and PK agree with Federated Wireless that the CBRS and 6 GHz bands offer templates on which the 4.9 GHz band could be built to support "operations by disparate users, including public safety, critical infrastructure, radio astronomy, and naval training operations," which thanks to the "flexible, cloud-based nature of dynamic spectrum sharing technologies," dynamic spectrum sharing systems could be "particularly responsive to, and purpose-built for, the peculiarities of a particular band, including the types and intensity of incumbent uses, varying intensities of use across geographies, contemplated uses for newly authorized services, the propagation characteristics of the band, priority access requirements, and more."[10]

OTI and PK further agree with Wireless Internet Service Providers Association (WISPA), which notes that the multiple SASs in CBRS have "prove[n] to be a successful spectrum management tool that both protects incumbents, including the U.S. military, from harmful interference, and enables a large variety of shared uses,"[11] WISPA correctly observes that this success is now informed by "several years of experience, with participation from a diverse multi-stakeholder group," a process that can be employed by the Commission in this band to ensure that public safety's needs for protection and coordination are met.

[10] Comments of Federated Wireless at 3.
[11] Comments of WISPA at 9.

In short, the Commission has at its disposal tried-and-tested spectrum sharing frameworks such as that in the CBRS band that protects U.S. Navy and military operations. Experience therefore suggests that opening the 4.9 GHz band for shared, open access secondary use would not inherently threaten harmful interference. The Commission should pursue policies to open this band for wider use on an open and free manner either as explicitly unlicensed, through a "use-it-or-share-it" framework, or through a tiered sharing system that includes a Generalized Authorized Access ("GAA") tier such as that in CBRS.

The record reflects the overwhelming evidence that dynamic spectrum management systems have proven to be a reliable and cost-effective means of coordinating secondary use of an occupied band, while fully protecting incumbent operations from harmful interference, even those with sensitive and real-time operations, such as the U.S. Navy. In fact, prior precedents in spectrum sharing frameworks such as the CBRS band in the 3.5 GHz band show how opening an underutilized band of spectrum for broader use by a wider variety of entities can bring the spectrum coordination needed to strengthen competition, consumer welfare, and innovation while robustly protecting incumbent operations. The Commission should build on these precedents—and the need for database coordination in the band—to implement the spectrum sharing framework that can make this frequency equitably available for a wide variety of providers on an open and free basis.

B. Automated Spectrum Coordination Will Benefit Public Safety and has Evolved to the Point that Concerns of Cost and Reliability Are Unfounded

Database coordination among even disparate uses of spectrum is not only feasible, as noted above, but also recognized as essential to sustain and promote effective public safety use of the 4.9 GHz band. The record demonstrates that public safety entities acknowledge that database coordination among at least public safety licensees would be beneficial and reduce or eliminate uncertainty about interference among licensees with overlapping jurisdictions. In addition, public safety entities acknowledge that a formal coordination process will involve providing more detailed information on deployments regardless of whether the database is used to coordinate secondary, shared use as well.

For example, the American Association of State Highway and Transportation Officials (AASHTO) supports the Commission's proposal to improve frequency coordination through the expanded collection technical information, noting: "Providing more detailed information does not cause a significant burden on the users, and more detailed information may in fact prove beneficial when, and if users experience harmful inference. The detailed information will benefit the interference mitigation process, and provide the information needed should the Commission require a formal coordination process for future 4.9 GHz implementations."[12] AASHTO suggests this can be done via expansion of the Universal Licensing System (ULS), which is not inconsistent with the implementation of a SAS.[13] If the familiarity of the ULS is preferable to entities such as AASHTO, the FCC data can be absorbed into a SAS administrator's database, much as the new Automated Frequency Coordination systems will do in the 6 GHz band to

[12] Comments of AASHTO at 3.
[13] *Id.*

protect incumbent microwave links. A coordination database actually adds an extra layer of protection from harmful interference to the existing ULS framework.

Just as the Commission's current rules stipulate that the Automated Frequency Coordination ("AFC") systems in two 6 GHz sub-bands will depend on updates to ULS to protect incumbents from harmful interference, that same process can be adopted for the 4.9 GHz band.[14] Additionally, the Commission has mandated database updates to facilitate sharing or band transitions in other contexts as well, such as the requirement that relocated C-Band earth stations update ULS.[15]

OTI and PK agree with WISPA that "licensing information in ULS can remain as is so as to not require software changes to ULS that will take time and resources for the Commission to implement," but that operators can also provide additional or more sensitive information to the SAS, "where it can be securely maintained and subject to a degree of public query. Further, as information changes, such as for priority or preemptive use, the SAS can quickly provide and share updated information without the need for public safety licensees to file an application."[16] The benefits of database coordination to public safety and their preference to use the existing ULS process to submit additional data are not incompatible with the certification of one or more SAS-like database providers that can rely on that ULS data to coordinate expanded secondary access by commercial users and, ideally, the public. The Commission should therefore pursue the win-win strategy of improving database coordination via dynamic spectrum sharing frameworks

[14] Report and Order and Further Notice of Proposed Rulemaking, ET Docket No. 18-295 and GN Docket No. 17-183 (Rel. April 24, 2020) ¶ 25.
[15] *See* Public Notice, International Bureau Releases Preliminary List of Incumbent Earth Stations in the 3.7-4.2 GHz Band in the Contiguous United States, IB Docket No. 20-205 (July 6, 2020), https://docs.fcc.gov/public/attachments/DA-20-703A1.pdf.
[16] Comments of WISPA at 18-19.

and mechanisms such as the SAS to achieve the dual goals of protecting public safety operations and promoting secondary use for a broad array of potential users à la CBRS.

The Enterprise Wireless Association and AASHTO claim that adopting a third-party administrator would increase costs and complexity.[17] However, the Commission's experience with the progression from the TV Bands Databases, to the current success of Spectrum Access Systems coordinating three-tier access to the CBRS band, to the applications for certification of AFC operators in 6 GHz, all clearly demonstrate that these unsupported assertions should be rejected. OTI and PK agree with Federated Wireless that the adoption of a flexible sharing framework with a "minimal set of common technical standards" and a SAS "provides regulatory and technological flexibility that allows use cases to develop over time" which subsequently "eliminates the need for the Commission to predict use cases for a particular band, and minimizes the time, cost, and impact of modifying regulations as technology and business cases emerge, effectively future-proofing the regulation of shared spectrum bands."[18]

OTI and PK further agree with DSA that a dynamic spectrum sharing model such as the CBRS framework would protect incumbent public safety operations while simultaneously bringing down equipment costs for *all* users thanks to the entrance of a broad set of new users.[19] Indeed, public safety licensees themselves have highlighted that the lack of a vendor ecosystem and robust coordination has resulted in the lackluster participation of potential licensees in the 4.9 GHz band. Fewer than 96 percent of eligible public safety entities have either not applied for

[17] Comments of Enterprise Wireless Association at 8; Comments of AASHTO at 3.
[18] Comments of Federated Wireless at 5.
[19] Comments of the Dynamic Spectrum Alliance at 2 ("Comments of DSA").

a license or have failed to deploy after obtaining a license, with activity particularly lacking outside of major metropolitan areas.[20]

Claims that the adoption of a SAS or similar geolocation database would add complexity and costs for the Commission, users, and consumers are not only unsupported, they ignore the fact that implementing such a system would likely facilitate economies of scale to *improve* overall costs. The addition of an automated spectrum maanagement coordinator—a neutral third-party—would streamline coordination and encourage entry and commercial deployments that would spread fixed costs over many more users. The costs of SAS coordination for the 4.9 GHz band would be further reduced by the likelihood that one or more current SAS or AFC providers could efficiently program their system to coordinate this band far faster and more inexpensively by leveraging their existing database, software and systems.

As Federated Wireless argues, a dynamic spectrum sharing database that is operated and developed by a private entity "is the most efficient, most economical, and lowest risk option for the Commission because the model for such a system already exists and can be quickly, easily, and inexpensively adapted for this application, while fulfilling each of the Commission's stated goals for the band."[21] OTI and PK further agree with Federated Wireless that the "scalability and adaptability of dynamic spectrum sharing technologies likewise eliminates the need for the Commission to consider other legacy approaches to spectrum management for the 4.9 GHz band, such as the use of a separate, nationwide band manager or the use of a band segmentation plan."[22]

---

[20] *Id.* at 3; APCO International, "4.9 GHz Task Force Report," at 12 (Sept. 28, 2015) ("APCO Task Force Report"), https://ecfsapi.fcc.gov/file/60001325364.pdf; Federal Communications Commission Press Release, "FCC Adopts New Rules to Increase Use of 4.9 GHz Spectrum Band (Sep. 30, 2020).
[21] Comments of Federated Wireless, Amendment of Part 90 of the Commission's Rules, WP Docket No. 07-100, FCC 18-33, (July 6, 2018) at 3.
[22] *Id.* at 6.

Public safety commenters that opposed a national or regional third-party coordinator also fail to account for the success of automated frequency coordination in the CBRS band to protect U.S. Navy operations, for TV White Spaces and, very soon, for wide swaths of the 6 GHz band. The Commission notes that "SASs currently are used to protect several types of incumbent operations—including critical Department of Defense radar systems, fixed satellite service earth stations, and incumbent terrestrial wireless licensees—as well as two tiers of users in the Citizens Broadband Radio Service."[23] Indeed, the past should prove prologue for the development of automated, scalable and cost-effective coordination of both primary and secondary users in the 4.9 GHz band.

OTI and PK agree with WISPA that the third-party SAS has "proved to be reliable and successful" in the CBRS band and that the Commission should therefore "adopt it for the 4.9 GHz band" and that the Commission's work and guidance through the 3.5 GHz and the 6 GHz bands "provide an excellent framework for a multi-stakeholder group to stand up a 4.9 GHz SAS."[24] Federated Wireless further notes that the immediate success of the CBRS framework and the "significant interest in AFC-managed access to the 6 GHz band point up the degree to which dynamic spectrum sharing models can work in different bands with different needs," which the Commission should harness in the 4.9 GHz band.[25] OTI and PK also agree with DSA that "from a practical standpoint, dynamic spectrum sharing in the 4.9 GHz band would be functionally similar to the CBRS band and would result in a win-win for all parties."[26]

[23] FNPRM ¶ 70.
[24] Comments of WISPA at 10-11.
[25] Comments of Federated Wireless at 4.
[26] Comments of DSA at 6.

III. The Record Highlights the Substantial Public Interest Benefits of Opening the Band for Open Access Sharing

As the Commission has repeatedly observed throughout this proceeding, the 4.9 GHz band is grossly underutilized and in dire need of revitalization. The status quo is unacceptable given the potential benefits of facilitating more widespread and intensive use of this 50 megahertz of prime mid-band spectrum. To achieve this, the Commission should open the 4.9 GHz band for open secondary access, either on an unlicensed or licensed-by-rule basis (as tier-two General Authorized Access). Doing so would empower competitive wireless ISPs, community anchor institutions, and any enterprise or other entity to deploy a network or service using this spectrum-as-infrastructure. Such a policy would be particularly beneficial in the rural, Tribal, and other hard-to-serve areas where 4.9 GHz band spectrum is not currently in use. Opening the band for shared access can also revitalize the device and equipment ecosystem in the 4.9 band and help drive down costs for incumbent public safety operators as well.

Because public safety use of the 4.9 GHz band is concentrated in metropolitan areas, opening access to 50 megahertz of mostly fallow mid-band spectrum on an unlicensed or GAA basis holds great promise to improve fixed wireless broadband service services in rural, Tribal, and other high-cost areas. As WISPA notes, adding 50 megahertz of spectrum to the capacity available to wireless ISPs will enable providers to "extend fixed broadband service to more rural areas and to improve service levels," a need heighted by the COVID-19 pandemic given the skyrocketing demand for "broadband connectivity, especially in rural markets, as remote learning, work from home and telemedicine shifted broadband usage to residential environments."[27]

[27] Comments of WISPA at 6.

The Commission should also consider the public interest benefits of improving the ecosystem of the band and driving down costs by opening the spectrum for secondary sharing on a non-exclusive basis. Allowing open and coordinated secondary access to this spectrum would also allow other entities in underserved and unserved areas—such as schools, libraries, college and manufacturing enterprise campuses, hotels, and other users—the ability to deploy their own networks as well. The rapid deployment of private LTE and enterprise IoT networks on very limited CBRS spectrum is an indication of the sort of innovation, competition and productivity that can flourish if additional open, shared mid-band spectrum is made available.

OTI and PK further agree with WISPA that "authorizing non-public safety use will lead to more investment and innovation in equipment and technology, creating more choices, and competitive choices, for public safety licensees as well as non-public safety users."[28] The uncertainty inherent in the 4.9 GHz band's overlapping geographic licensing areas, coupled with a lack of spectrum coordination, has deterred potential deployments and any viable equipment market for cost-effective public safety gear. WISPA correctly observes that the success of the adjacent 5 GHz band offers the Commission a roadmap towards similar benefits in the 4.9 GHz band. The idea tracks with basic economics: "As production and sales volume increases, equipment costs will decrease, affording public safety users yet another benefit." Economies of scale could be further achieved due to the fact that some equipment for 5 GHz band spectrum can be put to use for 4.9 GHz band spectrum "with the appropriate software license, and more no doubt could be adapted to do so if there were sufficient demand."[29]

Several public safety commenters agree that opening the 4.9 GHz band for sharing on a secondary basis will improve the equipment market for public safety licensees. The National

[28] *Id.* at 7.
[29] *Id.* at 7-8.

Public Safety Telecommunications Council argues that sharing will "further expand usage in the band, instill a larger equipment market and provide a more compatible spectrum landscape for public safety operations than auctioning the band to commercial use and/or allowing unlicensed operations."[30] Additionally, in its Task Force Report, APCO highlighted the negative impact of very limited public safety deployments and the potential for non-public safety use to drive down costs:

> … [T]he public safety user community remains small relative to the greater consumer marketplace. This factor has historically resulted in a limited vendor ecosystem, specialized devices, and higher costs. Public safety agencies also typically have limited financial resources, which often need to be budgeted over time. Thus affordability, feature-sets, and equipment options are also important considerations for public safety adoption. Manufacturers need to be able to achieve economies of scale to reduce costs in order to provide a variety of network and device options to public safety users.[31]

Finally, it is notable that the record reflects no interest from the mobile industry in the 4.9 GHz band. This suggests that secondary sharing on an open access basis has the greatest potential public interest benefit among the options before the Commission to further the goal of more effective and efficient use of the band. The Commission should therefore adopt the win-win policy of opening the band for secondary shared access, coordinated by a geolocation database mechanism capable of both protecting public safety operations and also eliminating uncertainty among public safety entities with overlapping jurisdictions.

[30] Comments of the National Public Safety Telecommunications Council at 1.
[31] APCO Task Force Report at 12.

IV. Conclusion

The record on balance strongly supports the Commission's dual goals of promoting more intensive and cost-effective use of the 4.9 GHz band for public safety communications on a primary basis, while also authorizing commercial use on a secondary and opportunistic basis. Achieving this win-win outcome is squarely in the public interest. Doing so will revitalize the band for public safety use, improve broadband equity, develop the equipment ecosystem, and ensure the protection of current and future public safety operations from harmful interference.

Respectfully submitted,

NEW AMERICA'S OPEN TECHNOLOGY INSTITUTE
AND PUBLIC KNOWLEDGE

Amir Nasr
Michael Calabrese
Wireless Future Project
New America's Open Technology Institute
740 15th Street NW, Suite 900
Washington, D.C. 20005

Harold Feld
Kathleen Burke
Admitted to the Bar under D.C. App. R. 46-A (Emergency Examination Waiver)
Public Knowledge
1818 N. Street NW, Ste 410
Washington, D.C. 20036

January 11, 2021